

ACCUSATIVE-OBLIQUE ALTERNATIONS IN JAPANESE AND THE UNACCUSATIVITY HYPOTHESIS*

SHIN FUKUDA
University of Hawai'i at Mānoa

1 Introduction

Since the advent of the Unaccusativity Hypothesis (Perlmutter 1978), one empirical issue that has played an important role in the analysis of unaccusativity is the existence of verbs that exhibit properties of both unaccusative verbs and unergative/transitive (Perlmutter 1978, Hoekstra 1984, Rosen 1984, Levin and Rappaport-Hovav 1989, 1995, Dowty 1990, van Valin 1990, Borer 1994, among others). These verbs are often called *variable behavior verbs* (Levin and Rappaport-Hovav 1989, 1995, Borer 1994). The existence of variable behavior verbs has been used as an argument against the claim that unaccusativity is syntactically encoded (Dowty 1990, van Valin 1990). According to the syntactic approach to unaccusativity, subjects of unaccusative verbs are originally internal arguments but undergo syntactic movement to become surface subjects, whereas subjects of unergative and transitive verbs are syntactic subjects throughout derivation (i.e. external arguments) (Burzio 1986). Thus, under the syntactic approach to unaccusativity, variable behavior verbs must involve two fundamentally different underlying syntactic structures when they are unaccusative verbs and when they are unergative verbs. However, standard unaccusativity diagnostics such as auxiliary selection and impersonal passive constructions by themselves do not directly support such an assumption. In fact, many unaccusativity diagnostics have been argued to be sensitive to non-syntactic factors such as lexical semantic features. Zaenen (1988) argues that impersonal passive constructions in Dutch are sensitive to volitionality or “protagonist control”. Leiber and Baayen (1997) argue that the auxiliary selection in Dutch is governed by fine-grained differences in the lexical semantics of verbs. Yet if single verbs can change between unaccusative verbs and unergative verbs due to certain lexical semantic features, should they still be analyzed as involving two fundamentally different underlying syntactic structures?

* Many thanks are due to the audience at FAJL5, Ivano Caponigro, Gabe Doyle, Grant Goodall, Dan Michel, and especially to Jon Sprouse for their helpful comments and discussions on earlier drafts of this paper.

In this paper, I analyze a set of two-place verbs in Japanese that allows their complements to be marked by either accusative case or an oblique marker, which I will call *accusative-oblique alternation verbs*:

- (1) a. Taro-ga **yama-o/ni** nobor -ta
 T-NOM **mountain-ACC/GOAL** ascend -PST
 ‘Taro ascended the mountain.’
 b. Taro-ga **ie-o/kara** de -ta
 T-NOM **home-ACC/SOURCE** come_off -PST
 ‘Taro left his home.’

First, I argue that these accusative-oblique alternation verbs are best analyzed as variable behavior verbs that can be realized as either unaccusative verbs or transitive verbs. I then present evidence from two formal acceptability judgment experiments that suggest that the accusative-oblique alternation verbs are associated with two distinct underlying syntactic structures. As such, this paper provides novel support for the syntactic analysis of unaccusativity.

The rest of this paper is structured as follows. Section 2 reviews two sets of two-place Japanese verbs that are discussed independently by Kuno (1973) and Teramura (1982) and argues that these two sets of verbs should be analyzed as two subtypes of the *accusative-oblique alternation verb type*. Section 3 presents a syntactic analysis of accusative-oblique alternation verbs as variable behavior verbs. Section 4 presents supporting arguments for the proposed analysis from the results of two formal acceptability judgment experiments. Section 5 concludes.

2 Accusative-Oblique Alternation Verbs in Japanese

Kuno (1973) and Teramura (1982) independently discuss two groups of two-place Japanese verbs whose complements can be marked with either accusative case *o* or an oblique marker.

Kuno (1973) discusses a group of two-place predicates in Japanese that allow their complements to be marked with either accusative case or an oblique marker *ni*.

- (2) a. Taro-ga **yama-o/ni** nobor -ta
 T-NOM **mountain-ACC/GOAL** ascend -PST
 ‘Taro ascended the mountain.’
 b. Keiko-ga **kawa-o/ni** kudar -ta
 K-NOM **river-ACC/GOAL** descend -PST
 ‘Keiko descended the river/to the river.’

Let us call this group of verbs *accusative-goal alternation verbs*. Kuno argues that the complement of accusative-goal alternation verbs is interpreted as PATH when it is marked with accusative case (*the accusative structure*) whereas it is interpreted as GOAL when it is marked with an oblique marker (*the oblique structure*). Therefore, the accusative structure is infelicitous when the referent of the complement can only be naturally interpreted as GOAL, such as *yane* ‘roof’ in (3a), whereas the oblique structure is infelicitous when the referent of the complement can only be naturally interpreted as PATH, such as *kaidan* ‘stairs’ in (3b).

- (3) a. Kodomo-ga **yane-ni/#o** nobor -ta
 child-NOM roof-GOAL/#ACC ascend -PST
 ‘The child climbed up to the roof.’
- b. Kodomo-ga **kaidan-o/#ni** nobor -ta
 child-NOM stairs-ACC/#GOAL ascend -PST
 ‘The child climbed up the stairs step by step.’ (modified from Kuno 1973: 99, (14))

Teramura (1982) independently notes that another group of Japanese verbs mark their complement either with accusative case or the source marker *kara* ‘from’. Let us call this group of verbs *accusative-source alternation verbs*.

- (4) a. Taro-ga **ie-o/kara** de -ta
 T-NOM **home-ACC/SOURCE** come_off -PST
 ‘Taro left his home.’
- b. Taro-ga **kokyo-o/kara** hanare -ta
 T-NOM **hometown-ACC/SOURCE** leave -PST
 ‘Taro left his hometown.’

Teramura shows that accusative-source alternation verbs impose selectional restrictions on their subjects when they are in the accusative structure. Thus, inanimate subjects are felicitous with these verbs only when they are in the oblique structure (Teramura 1982:107).

- (5) a. Midori-iro-no ekitai-ga **kizugichi-kara/#o** de -ta
 Green-color-GEN liquid-NOM **wound-SOURCE/#ACC** come_out -PST
 ‘Green substance came out of the wound.’
- b. Kurippu-ga **beruto-kara/#o** hazure -ta
 clip-NOM **belt-SOURCE/#ACC** come_off -PST
 ‘The clip came off from the belt.’

I argue that these two classes of verbs should be analyzed as sub-types of the same class of verbs because they exhibit essentially the same semantic contrasts between the accusative structure and the oblique structure. First, the following examples show that the interpretation of the complement of accusative-source alternation verbs changes between the two structures just like the case of the complement of accusative-goal alternation verbs:

- (6) a. Taro-ga **UCSD-o/kara** de -ta
 T-NOM **UCSD-ACC/SOURCE** come_out -PST
 ACCUSATIVE: ‘Taro left UCSD.’ or ‘Taro graduated from UCSD.’
 OBLIQUE: ‘Taro left UCSD.’
- b. Taro-ga **shokuba-o/kara** hanare -ta
 T-NOM **work place-ACC/SOURCE** separate -PST
 ACCUSATIVE: ‘Taro left his office.’ or ‘Taro retired/took a break from his work.’
 OBLIQUE: ‘Taro left his office.’

(6a-b) in the accusative structure have two meanings: one expresses that the subject simply moved away from UCSD or the office whereas the other implicates that the subject was engaged

in some activity in UCSD/the office prior to leaving these locations. In contrast, their oblique counterparts have only the first meaning.

Second, accusative-source alternation verbs impose selectional restrictions on their subjects only when they are in the accusative structure just as accusative-source alternation verbs have been argued to do. While most of accusative-goal alternation verbs are motion verbs and usually require animate subjects, one accusative-goal alternation verb, *sawar* ‘touch’, can readily take inanimate subjects. Crucially, when it has an inanimate subject, it must be in the oblique structure (7a) while such a restriction is not observed when it has an animate subject (7b).

- (7)a. **Keiko-no sukaato-ga** yuka-ni/#o sawar -ta
K-GEN skirt-NOM floor-GOAL/ACC touch -PST
 ‘Keiko’s skirt touched the floor.’
- b. **Keiko-ga** yuka-o/ni sawar -ta
K-NOM floor-ACC/GOAL touch -PST
 ‘Keiko touched the floor.’

Thus, the evidence discussed in this section shows that accusative-goal alternation verbs and accusative-source alternation verbs exhibit similar semantic contrasts. These similarities strongly suggest that they are sub-types of the same alternations: namely, *accusative-oblique alternations*.

3 The Alternation Verbs as Variable Behavior Verbs

This section presents a syntactic analysis of accusative-oblique alternation verbs as variable behavior verbs. In this analysis, an alternating verb in the accusative structure is a transitive verb whose subject is base-generated as [Spec, ν P] and complement is the internal argument of the verb (8a). The same verb is a two-place unaccusative verb in the oblique structure. Its subject is base-generated as the internal argument and its complement is the object of a postposition (8b).

- (8) a. accusative structure:
 [_{TP} **SUBJ**_i-NOM [_{ν P} **SUBJ**_i [_{VP} **COMP-ACC** V] ν] T]
- b. oblique structure:
 [_{TP} **SUBJ**_i-NOM [_{ν P} [_{VP} [_{PP} **COMP-P**] [_{ν} **SUBJ**_i V]] ν] T]

The proposed analysis accounts for the association between the two complement markings and the presence/absence of the selectional restrictions on subjects based on the standard assumptions about the structure of transitive and unaccusative sentences in the ν P syntax (e.g. Krazter 1994, Chomsky 1995). With the accusative structure, the alternating verbs are transitive verbs, whose subjects receive an external θ -role from ν as illustrated in (9):

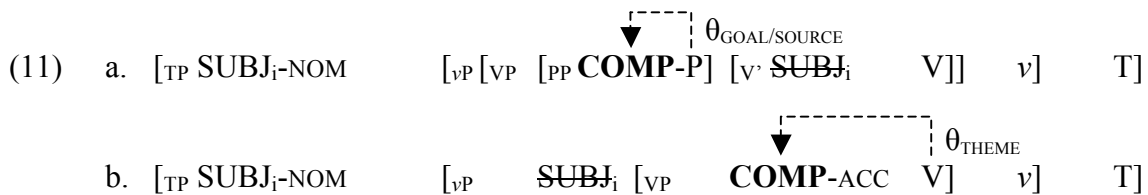
- (9) [_{TP} **SUBJ**_i-NOM [_{ν P} **SUBJ**_i [_{VP} **COMP-ACC** V] ν] T]
- θ_{AGENT}

Under such an assumption, subjects of the alternating verbs in the accusative structure must be compatible with a given external θ -role, and inanimate entities usually lack properties that are required for typical external θ -roles such as AGENT. With the oblique structure, the same verbs are realized as two-place unaccusative verbs. Thus, they have the underlying structure in (10):



Crucially, subjects of unaccusative verbs are internal arguments and they receive θ -roles appropriate for internal arguments, such as *THEME*. Therefore, subjects of the alternating verbs in the oblique structure are not subject to the same selectional restrictions as subjects of the same verbs in the accusative structure are.

The interpretation of the complement of the alternating verbs differs between the two structures because they involve two different θ -role assigners of the complement. In the oblique structure, the complement receives its θ -role from the postposition (*ni* or *kara*) (11a). In the accusative structure, the complement is thematically licensed by the lexical verb (11b).



4 Evidence from Formal Acceptability Judgment Experiments

This section presents the results of two formal acceptability judgment experiments that examined two predictions made by the proposed analysis and argues that these results support that the proposed analysis.

4.1 Experiment 1: Selectional Restrictions

According to the proposed analysis, subjects of the accusative-oblique alternation verbs are assigned an *AGENT* θ -role in the accusative structure and a *THEME* θ -role in the oblique structure. *AGENT* θ -roles are generally only compatible with animate (volitional) referents, whereas *THEME* θ -roles are in principle compatible with both animate and inanimate referents. This predicts that inanimate subjects will be more strongly dispreferred with these verbs in the accusative structures than the same verbs in the oblique structure. Experiment 1 tested this prediction.

4.1.1 Materials and Design

Experiment 1 had a 2 x 2 design of *STRUCTURE* (accusative vs. oblique) and *ANIMACY* (animate vs. inanimate). Three accusative-goal verbs (*nobor* ‘ascend’, *kudar* ‘descend’ and *sawar* ‘touch’) and three accusative-source alternation verbs (*de* ‘come out’, *hanare* ‘separate’ and *hazure* ‘come off’) were used in the materials. 5 lexicalizations of each verb were constructed for each of the 4 conditions and distributed among 5 lists using a Latin Square procedure. The 24 experimental sentences in each list were mixed with 28 filler sentences (52 sentences in total) and they were pseudo-randomized. Examples of the experimental sentences are provided below.

- (12)a. OBLIQUE STRUCTURE – ANIMATE SUBJECT
 Sachiko-no gakusei-ga kawaiteinai penki-ni sawar -te -i -ta
 S-GEN student-NOM wet paint-GOAL touch -GER -be -PST
 ‘Sachiko’s students were touching the wet paint.’
- b. OBLIQUE STRUCTURE – INANIMATE SUBJECT
 Sachiko-no kami-ga kawaiteinai penki-ni sawar -te -i -ta
 S-GEN hair-NOM wet paint-GOAL touch -GER -be -PST
 ‘Sachiko’s hair was touching the wet paint.’
- c. ACCUSATIVE STRUCTURE – ANIMATE SUBJECT
 Sachiko-no gakusei-ga kawaiteinai penki-o sawar -te -i -ta
 S-GEN student-NOM wet paint-ACC touch -GER -be -PST
 ‘Sachiko’s students were touching the wet paint.’
- d. ACCUSATIVE STRUCTURE – ANIMATE SUBJECT
 Sachiko-no kami-ga kawaiteinai penki-o sawar -te -i -ta
 S-GEN hair-NOM wet paint-ACC touch -GER -be -PST
 ‘Sachiko’s hair was touching the wet paint.’

These sentences were presented using a free survey website. The task was a 5-point Likert scale task with 1 representing “unnatural” and 5 representing “natural”. Thirty self-reported monolingual Japanese speakers were recruited by e-mail messages and participated in the experiment. They received no compensation. The obtained raw ratings were z-score transformed to correct for possible individual differences and analyzed using linear mixed-effects models using STRUCTURE and ANIMACY as fixed factors. All p -values were estimated using the MCMC method implemented in the languageR package for R (Baayen 2008).

4.1.2 Results and Discussion

Figure 1 presents the results of the experiment.

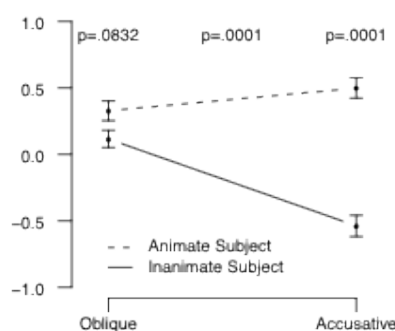


Figure 1: Interactions between animacy of subjects and two alternative complement markings

As expected, the mean acceptability ratings of sentences with animate subjects were not significantly different between the accusative structure and oblique structure ($p = .0832$). In contrast, the mean acceptability ratings of the sentences with inanimate subjects were significantly different between the accusative and oblique structure ($p = .0001$) with the mean of the oblique structure significantly higher than the mean of the accusative structure. These results

strongly suggest that native speakers associate the two alternative complement markings with presence/absence of selectional restrictions beyond idiosyncratic differences across individual accusative-oblique alternation verbs.

4.2 Experiment 2: Licensing of “Stranded” Numeral Classifier Phrases

In Japanese, numeral classifier phrases (NCPs) such as *5-nin* ‘5 people’ can be separated from its host NPs (13a), but this option is not always available as shown by (13b).

- (13)a. **Gakusei**_i-ga ohisu-ni **5-nin**_i ki -ta
Student_i-NOM office-GOAL **5-CL**_i come -PST
 ‘Five students came to the office.’
- b. ***Gakusei**_i-ga geragerato **5-nin**_i waraw -ta
student_i-NOM loudly **5-CL**_i laugh -PST
 ‘Five students laughed loudly.’

Miyagawa (1989) argues that NCPs and their host NPs must c-command each other at one point of derivation. According to this analysis, the NCP in (15a) can be ‘stranded’ in the preverbal position because the verb *ki* ‘come’ is an unaccusative verb and its subject was a base-generated inside the VP as internal argument, where it is in a mutual c-command relation with the NCP.

- (14) **Gakusei**_i-ga [_{VP} ohisu-ni **5-nin**_i **t**_i ki] -ta
Student_i-NOM [_{VP} office-GOAL **5-CL**_i **t**_i come] -PST

In contrast, subjects of unergative verbs such as *waraw* ‘laugh’ (15b) fail to license ‘stranded’ NCPs because they are external argument and as such they are generated outside of VP (i.e. [Spec, *v*P]). If these verbs’ subjects are never inside VP, they could not have been in a mutually c-commanding relation with a NCP inside VP.

- (15) ***Gakusei**_i-ga [_{vP} **t**_i [_{VP} geragerato **5-nin**_i waraw]] -ta
student_i-NOM [_{vP} **t**_i [_{VP} loudly **5-CL**_i laugh]] -PST

Given this analysis of NCPs, the proposed analysis of the accusative-oblique alternations makes a clear prediction about the licensing of stranded NCPs by the subjects of accusative-oblique alternation verbs. When these verbs are in the accusative structure, they are transitive verbs and their subjects are base-generated external arguments. Thus, they should be unable to license an NCP stranded in a post-complement position (16a). In contrast, the same verbs in the oblique structure should be able to license an NCP stranded in a post-complement position since they are unaccusative verbs and their subjects are base-generated internal arguments (16b).

- (16)a. *[_{TP} **SUBJ**_i-NOM [_{vP} ~~**SUBJ**~~_i [_{VP} COMP-ACC **NCP**_i V] *v*]] T]
 b. [_{TP} **SUBJ**_i-NOM [_{vP} [_{VP} [_{PP} COMP-P] [_v ~~**SUBJ**~~_i **NCP**_i V]]] T]

Experiment 2 was designed to test this prediction.

4.2.1 Materials and Design

Experiment 2 had a 2x2 design of STRUCTURE (oblique vs. accusative) and STRANDING (stranded NCP vs. non-stranded NCP).¹ Two accusative-goal alternation verbs (*sawar* ‘touch’ and *nobor* ‘ascend’) and two accusative-source alternation verbs (*de* ‘come out’ and *hanare* ‘separate’) were used in the materials. 5 lexicalizations of each verb were constructed for each of the 4 conditions and distributed among 5 lists using a Latin Square procedure. The 16 sentences were combined with 44 filler sentences that also involved NCPs (60 sentences in total). Each list was then pseudo-randomized. Examples of the experimental sentences are provided below.

(17)a. OBLIQUE – NON-STRANDED NCP

Jimushitsu-no **jyuugyooiin_i-ga** **yo-nin_i** sono kinko-ni sawar -ta
Office-GEN employee-NOM 4-CL that safe-GOAL touch -PST
‘Four office employees touched the safe.’

b. OBLIQUE – STRANDED NCP

Jimushitsu-no **jyuugyooiin_i-ga** sono kinko-ni **yo-nin_i** sawar -ta
Office-GEN employee-NOM that safe-GOAL 4-CL touch -PST
‘Four office employees touched the safe.’

c. ACCUSATIVE – NON-STRANDED NCP

Jimushitsu-no **jyuugyooiin_i-ga** **yo-nin_i** sono kinko-o sawar -ta
Office-GEN employee-NOM 4-CL that safe-ACC touch -PST
‘Four office employees touched the safe.’

d. ACCUSATIVE – STRANDED NCP

Jimushitsu-no **jyuugyooiin_i-ga** sono kinko-o **yo-nin_i** sawar -ta
Office-GEN employee-NOM that safe-ACC 4-CL touch -PST
‘Four office employees touched the safe.’

The experiment was conducted at Kansai Gaidai University in Osaka, Japan with 53 university students.² The task was magnitude estimation (Stevens 1957, Bard et al. 1996, Keller 2000, Featherston 2005, Sprouse 2011) and was presented as a paper survey. The reference sentence (i.e, the standard) was identical for all 5 surveys, and was in the middle range of acceptability. It was assigned value of 100 (the modulus). The experiment began with a practice phase during which participants estimated the lengths of 7 lines using another line as a reference (standard) set to a modulus of 100. In the main phase of the experiment, 10 items were presented per page, with the standard appearing at the top of every page inside a textbox.

4.2.2 Results and Discussion

The results of Experiment 2 are presented in Figure 2 below.

¹ The experiment reported in this section is a sub-experiment of a larger experiment which also examined the distribution of NCPs and their host NPs with unaccusative and unergative verbs. Only the results of the sub-experiment with the alternating verbs are presented here due to space limitation.

² I would like to express my gratitude to Hajime Ono, who allowed us to run this experiment with his students.

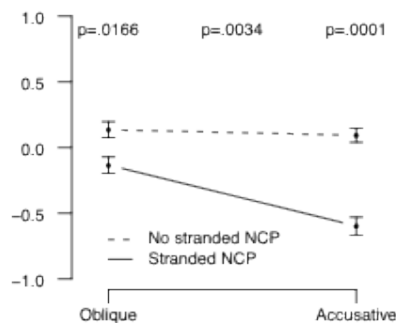


Figure 2: Interactions between the two complement markings and stranding of NCPs

As can be seen above, the difference between the mean acceptability ratings of the sentences with the alternating verbs in the accusative structure with and without a stranded NPC is significant ($p = .0001$). The difference between the sentences with the accusative-oblique alternating verbs in the oblique structure with and without a stranded NCP was also significant ($p = .016$); however, the significant interaction ($p = .0034$) suggests that dispreference for stranded NCPs is greater for the alternating verbs in the accusative structure than for the same verbs in the oblique structure. Thus, the results show that it is significantly more difficult for subjects of the alternating verbs to license a post-complement NCP when they are in the accusative structure.

4.3 Discussion

The results of Experiment 1 showed native speakers judged sentences with the alternating verbs with animate subjects in the two alternative structures equally well while the same verbs with inanimate subjects were judged poorly with the accusative structure than with the oblique structure. These findings strongly suggest that native speakers analyze that the two interpretations of the alternating verbs are closely associated with their underlying syntactic structures and not with individual verbs' idiosyncratic lexical semantic requirements, as they consistently associate the two alternative structures with the two sets of interpretations. The results of Experiment 2 showed that native speakers found significantly more difficult to associate subjects of the alternating verbs with post-complement NCPs if the verbs are in the accusative structure. This is predicted by the proposed analysis, according to which only subjects of the alternating verbs in the oblique structure are base-generated internal arguments. As such, these findings provide strong pieces of evidence for the proposed analysis.

5 Conclusion

In this paper, I have argued that the variable-behavior of accusative-oblique alternating verbs is evidence in support of the syntactic unaccusativity hypothesis if one analyzes the accusative structure as an unergative/transitive structure and the oblique structure as an unaccusative structure. As evidence, I presented two formal experiments that used the licensing of animate subjects and stranded numeral classifier phrases as diagnostics of the structural differences predicted by the structural unaccusativity hypothesis and argued that the accusative-oblique alternating verbs demonstrate the structural properties of unaccusativity.

References

- Baayen, R. Harold. 2008. *Analyzing Linguistic Data. A Practical Introduction to Statistics Using R*. Cambridge: Cambridge University Press.
- Bard, Ellen G., Dan Robertson and Antonella Sorace. 1996. Magnitude estimation of linguistic acceptability. *Language* 72: 32-68.
- Borer, Hagit. 1994. The projection of arguments. In *Functional Projections: University of Massachusetts Occasional Papers 17*, ed. by E. Benedicto and J. Runner, 19-48. Amherst: GLSA.
- Burzio, Luigi. 1986. *Italian Syntax: Government and Binding Approach*. Dordrecht: Reidel.
- Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, Mass: MIT Press.
- Dowty, David. 1990. Thematic proto-roles and argument selection. *Language* 67: 547-619
- Featherston, Sam. 2005. Magnitude estimation and what it can do for your syntax: some wh-constraints in German. *Lingua*, 115(11): 1525-1550.
- Hoekstra, Teun. 1984. *Transitivity*. Dordrecht: Reidel.
- Keller, Frank. 2000. *Gradiance in grammar: Experimental and computational aspects of degrees of grammaticality*. Doctoral dissertation, University of Edinburgh.
- Kratzer, Angelika. 1994. On external arguments. In *Functional Projections: University of Massachusetts Occasional Papers 17*, ed. by E. Benedicto and J. Runner, 103-130. Amherst: GLSA.
- Kuno, Susumu. 1973. *The structure of the Japanese language*. Cambridge, MA: MIT Press.
- Leiber, Rochelle and Baayen, R. Harold. 1997. A semantic principle for auxiliary selection in Dutch. *Natural Language and Linguistic Theory* 15: 789-845.
- Levin, Beth and Malka Rappaport-Hovav. 1989. An approach to unaccusative mismatches. *NELS 19*: 314-328.
- Levin, Beth and Malka Rappaport-Hovav. 1995. *Unaccusativity: at the Syntax-Lexical Semantics Interface*. Cambridge, Mass: MIT Press.
- Miyagawa, Shigeru. 1989. *Structure and Case Marking in Japanese*. New York: Academic Press.
- Perlmutter, David. M. 1978. Impersonal passives and the unaccusative hypothesis. *BLS* 4: 157-189.
- Rosen, Carol. 1984. The Interface between Semantic Roles and Initial Grammatical Relations. In *Studies in Relational Grammar 2*, ed. by D. M. Perlmutter and C. Rosen, 38-80. Chicago: University of Chicago Press.
- Sprouse, Jon. 2011. A test of the cognitive assumptions of magnitude estimation: Commutativity does not hold for acceptability judgments. *Language* 87: 274-288.
- Stevens, S. S. 1957. On the psychophysical law. *Psychological Review*, 64, 153-181.
- Teramura, Hideo. 1982. *Nihongo no Shintakusu to Imi I* [Japanese Syntax and Semantics I]. Kuroshio: Tokyo.
- van Valin, Robert. 1990. Semantic parameters of split intransitivity. *Language* 66: 221-260.
- Zaenen, Anne. 1988. *Unaccusative Verbs in Dutch and the Syntax-Semantics Interface*. Report No. CSLI-88-123 Stanford: Center for the Study.